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BIOLOGY OF RED-NECKED PHALAROPES (*PHALAROPUS LOBATUS*) AT THE WESTERN EDGE OF THE GREAT BASIN IN FALL MIGRATION

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ABSTRACT.—Large numbers of Red-necked Phalaropes migrate overland across the Great Basin in fall, occurring commonly at highly saline lakes. Migrants occur at Mono Lake, California, from mid-July to mid-October. The earliest migrants are adult females, followed several weeks later by adult males, and finally by juveniles. Adults make up ca 75% of the population, with males outnumbering females by 5:4. From 1980 through 1984 an estimated 52,000–65,000 birds passed through the area each year, except in 1983, when only 36,000 were recorded. The low number might be attributable to high mortality on oceanic wintering grounds in the Southern Hemisphere in 1982 associated with the severe El Niño. At Mono Lake the phalaropes concentrate near the shore and feed almost exclusively on brine flies. The migrants neither gain much weight nor accomplish much molt during their sojourn, which suggests that the average stay is only a few days. Some aspects of the molt pattern differ from those reported elsewhere.

After the breeding season, many Red-necked Phalaropes (*Phalaropus lobatus*) migrate from breeding grounds in the arctic regions of the New World to pelagic wintering areas in the equatorial Pacific Ocean. Substantial numbers, presumably from the west and central Canadian Arctic, move overland, and each fall hundreds of thousands occur in the Great Basin of the western United States. Concentrations exceeding one million individuals have been estimated at Great Salt Lake, Utah (Kingery 1982). Thousands also occur at Lake Abert, Oregon (K. Boula, personal communication), Mono Lake, California (Cogswell 1977, Winkler 1977), and Stillwater National Wildlife Refuge, Fallon, Nevada (S. Thompson, personal communication), and large but unestimated numbers visit the Salton Sea (McCaskie 1970, Garrett and Dunn 1981). The existence of an overland migration route in this species has long been known (e.g., Fisher 1902, Bent 1927, Grinnell and Miller 1944). What does not seem to have been appreciated, however, is that saline lakes are preferred stopping places.

This report documents the fall migration at Mono Lake, California. It is based on studies that spanned the entire fall migration period, July through mid-October, for six consecutive years (1980–1985). The major goals were to document abundance, period of occurrence, and ecological requirements of the Red-necked Phalarope and to determine the composition of the population throughout the migration period.

METHODS

Mono Lake (surface elevation 6,380 ft in 1984) is a large (ca 160 km) basin lake at the western edge of the Great Basin in east central California. It is highly saline (surface salinity 75–90 0/00 during this study) and alkaline (pH $\cong$ 10) and contains no fishes (see Hubbs and

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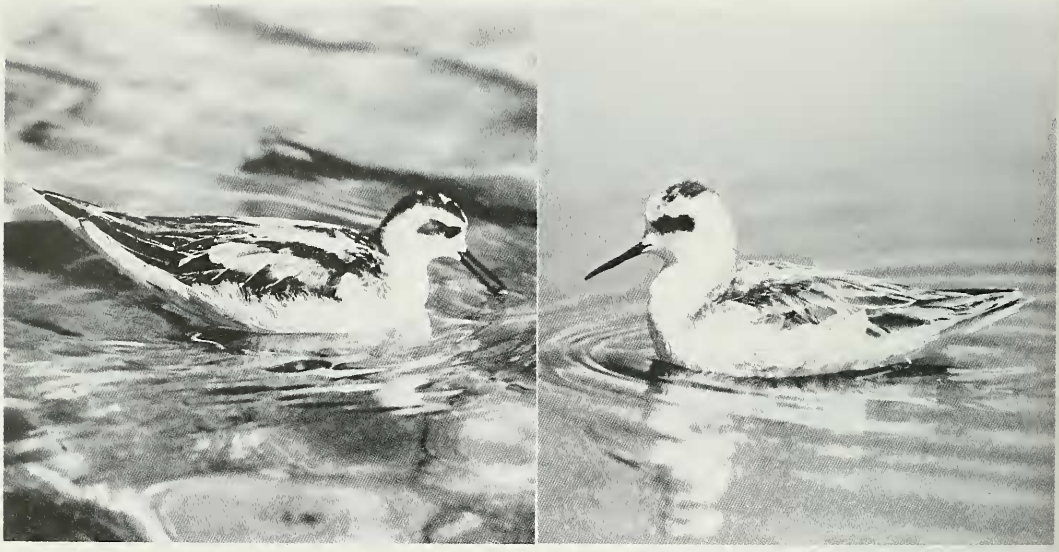

Fig. 1 Juvenile (left) and adult (right) Red-necked Phalaropes.

Miller 1948). Accordingly, the aquatic invertebrates (brine shrimp, *Artemia* sp., and brine flies, *Ephydra hians*) that provide food for the phalaropes and a few other species of migratory birds can attain great abundances.

I made behavioral observations through the entire migration period. Specimens were weighed, measured, and examined for molt and external parasites. Stomach contents were identified using a binocular microscope. Fat-free weights were determined using standard ether-extraction techniques. I estimated the percentage of molting feathers in each of the body tracts and determined molt scores for primaries and rectrices. A value of 0 is given to an unmolted feather, 5 for one that has been replaced, and 1 to 4 for intermediate stages (e.g., Morrison 1976). Thus, a bird that has replaced all its primaries and rectrices would receive scores of 100 (i.e., 5×10 primaries $\times$ 2 wings) and 60 (5×12 rectrices).

CENSUSING.—Because of their localized distribution and preference for nearshore habitat, phalaropes are relatively easily censused. Counts from a boat cruising ca 400 m offshore will reveal nearly all birds, except those hidden behind tufa formations. As the migration period progresses, it is not uncommon to find flocks of 30–400 birds 2 km or more from shore; these can be detected by routine transects. Censusing by boat produces consistent and replicable results. I estimate that errors did not exceed 15%–20%, even when populations were large. For example, replicate censuses of birds on the eastern half of Mono Lake on 31 August and 1 September 1981 resulted in estimates of 6,800 and 7,053 birds, a difference of 3.5%

AGE AND SEX RATIOS.—Male Red-necked Phalaropes bear the responsibility for incubation and caring for the young. Females leave the breeding grounds about the time young hatch and are followed by the adult males several weeks later and, finally, by the juveniles (Hildén and Vulanto 1972). At Mono Lake the migration period of each of these groups is protracted, perhaps because: (1) the population is composed of birds from several nesting areas, where the start of breeding may vary by a week or more; (2) the species is polyandrous, and females that obtain more than one mate remain on the breeding grounds longer than those that obtain a single mate; (3) and males that lose their eggs or young migrate earlier than successful nesters.

Sex ratios in adults usually cannot be determined in the field because plumage differences, although pronounced on the breeding grounds, dull with the onset of molt. Estimates in this report are derived largely from specimens collected with no conscious bias and are supplemented by banding data (Winkler 1977). Age ratios, however, can be determined by plumage (Fig. 1; Prater et al. 1977)

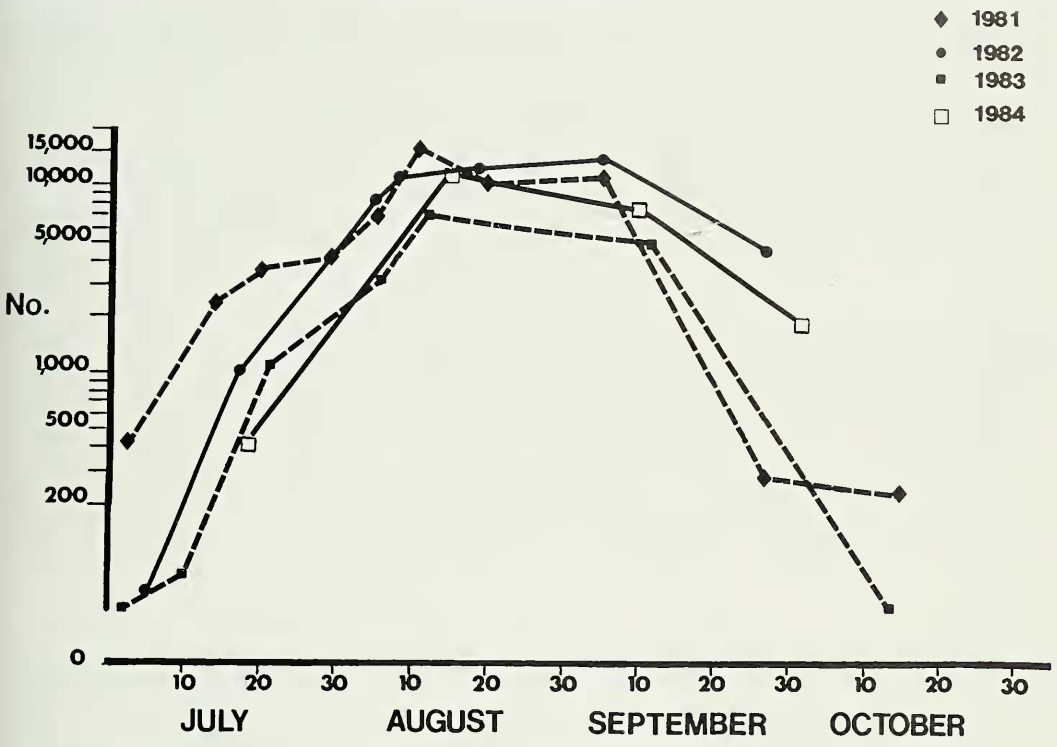

Fig. 2. Population size of Red-necked Phalaropes at Mono Lake, California, 1982–1984.

until mid-September, or later. Because the distribution of adults and juveniles is not necessarily similar, I determined age ratios in several areas of the lake, attempting to achieve a minimum total sample size of 100. Data obtained in that manner were similar to these obtained by collecting.

RESULTS

CHRONOLOGY.—In my experience, only small numbers of the Red-necked Phalarope pass through the Mono Basin each spring. I have seen flocks totaling 200 birds on several occasions on dates ranging from 30 April to 24 May, with a maximum of 800–1,000 on 13 May 1984. That much larger numbers may occur occasionally can be inferred from Ryser's (1985) report of thousands killed near Reno, Nevada, in mid-May 1964 (see also Gaines 1977). One or two may summer in some years. The few birds that appear in late June are often molting heavily, which suggests that they may not have reached the nesting areas; certainly they could not have bred. Usually there was no significant influx of migrants until the last third of July, although in 1981 more than 2,000 were present by mid-July (Fig. 2). Numbers increase through early August, peak near 10 August at ca 12,000 individuals, and remain high for the next month. A decrease is evident by 10–15 September; by early October fewer than 200 remain; and by the last third of October the species has departed. The latest dates on which phalaropes were present (based on irregular surveys) were 17 October 1980, 9 October 1981, 21 October 1982, and 14 October 1983.

Only once did I see migrants depart. On 6 August 1982, four flocks totaling 450 birds left the mouth of a freshwater creek where they had been bathing, climbed high toward the Sierra Nevada, and disappeared to the west. This suggests that some migrants may move directly toward the Pacific Ocean.

COMPOSITION OF THE POPULATION.—Adult females predominated among the early migrants (Fig. 3). The rapid population increase in late July (Fig. 2) results from the arrival of postbreeding males. By late July adult females composed fewer than half the popula-

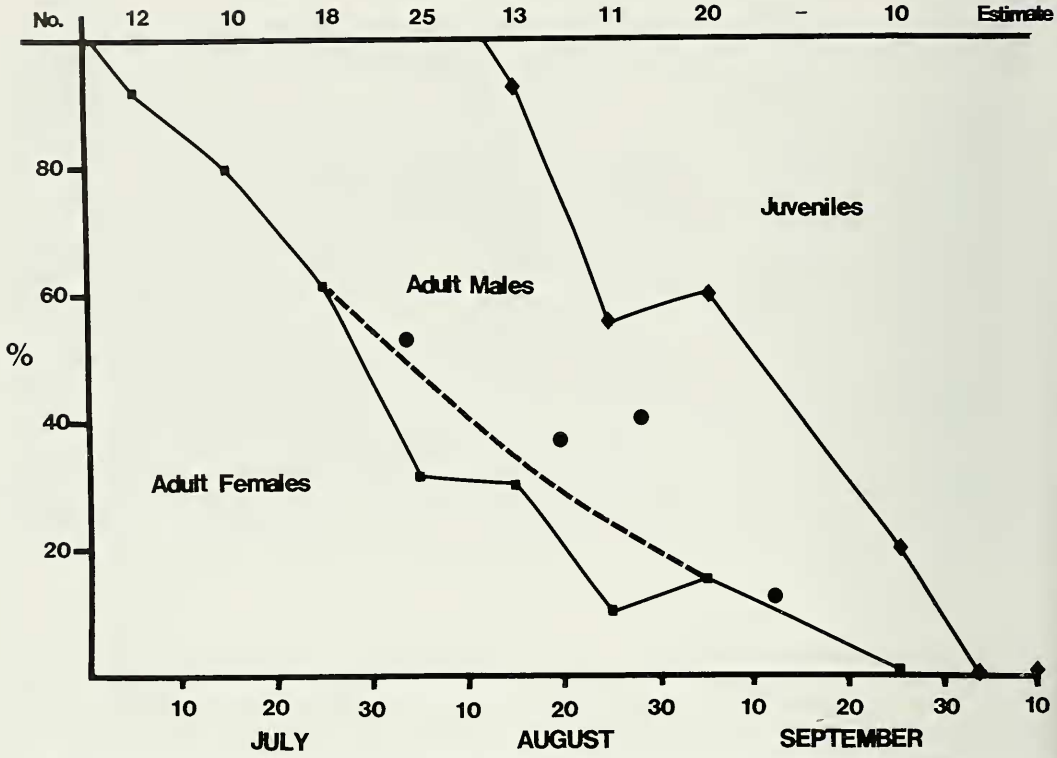

Fig. 3. Age and sex ratios of Red-necked Phalaropes based on specimens collected from 1980 through 1982. The percentage of adult females determined by banding studies (Winkler 1977) is shown by ●. The dotted line shows the inferred average percentage of adult females from late July through mid-September.

tion, and their abundance decreased through the remainder of the fall. Juveniles began arriving in mid-August (earliest 13 August 1980, 10 August 1981, 2 August 1982, after 6 August 1983), predominated by the first of September, and composed virtually all the population by early October.

SIZE OF THE POPULATION.—The size and composition of the population at major phases of the migration period are shown in Table 1. This species does not use Mono Lake either as a molting or staging area (see below) and, because the arrival period of each age and sex class is protracted, I infer that the average stays of most migrants ranged from 5 to 14 days (see also Evans 1984, Kersten and Smith 1984). Short stop-overs were also suggested by weight data (see below). The bulk of the migration for any age and sex category is accomplished in 30 days. Assuming an average stay of 10 days, one can estimate the total population at roughly three times the sum of the peak counts in each category. If so, 52,000 Red-necked Phalaropes passed through the Mono Basin in 1981, 65,500 in 1982, 36,000 in 1983; limited data from 1980 and 1984 suggest a population similar to 1981. Although the validity of the multipliers is unknown, the census data are sufficiently accurate to show that annual differences in abundance are real.

DISTRIBUTION.—Red-necked Phalaropes are pelagic for much of the year, but at Mono Lake they tend to avoid midlake habitats in favor of shallow areas within 200 m of shore. There they congregate over shallowly submerged rock formations, which provide a substrate for pupating brine flies; brine flies of all ages are their major food.

In July migrants appear along the central north shore, where there are large expanses of tufa-encrusted rocks. As numbers increase the population spreads laterally, and by mid-August birds are found almost anywhere on the periphery where there is submerged rock.

Distributional patterns were similar each year (Fig. 4), with two exceptions. In early September 1981 approximately 2,500 of 9,000 birds were flocking offshore, perhaps in antic

TABLE 1. Size and composition of Red-necked Phalarope populations at Mono Lake, California, 1981–1984.

	Population size			Composition[a]					
	Number observed			Adult Female		Adult Male		Juvenile	
	Western[b]	Eastern	Estimated total	%	N	%	N	%	N
1981									
2–3 Jul	9	303	400	[95]	380	[5]	20		
14–15 Jul	805	1,070	2,050	[80]	1,640	[20]	410		
21 Jul	—	—	3,000						
24 Jul	1,100–1,200	ND	—	[60]		[40]			
29–30 Jul	550+	1,500+	3,600	[55]	1,980	[45]	1,620		
4 Aug	3,445	ND	6,000	[48]	2,880	[52]	3,120	.02	120
11 Aug	3,708	6,370	12,000	[35]	4,200	[63]	6,840	2	960
19 Aug	4,300	2,130	8,500	[33]	2,805	[47]	3,995	20	1,700
31 Aug	7,030	—	—	—		—		64	
1–2 Sep	6,800	3	9,000	[13]	1,110	[17]	1,530	70	6,300
22 Sep	50	165	250	—		[20]	50	80	200
9 Oct	—	0	20	—		—	—	100	20
Total (%)					14,995(35.8)		17,585(42.0)		9,300(22.2)
1982									
2–4 May	200	—	200						
23 Jun	2	—	2	100	2	—	—		
5 Jul	5		5	[92]	5	[8]			
11 Jul	2	—	10	[80]	8	[20]	2		
17–19 Jul	100	725	1,000+	[80]	800	[20]	200		
25–27 Jul	100	1,100	1,500	[60]	900	[40]	600		
2–4 Aug	5,540	2,900	8,500	[58]	4,930	[42]	3,570	0.2	16
6–8 Aug	5,350	2,600	10,000	[58]	5,800	[42]	4,200	0.2	16
18–19 Aug	7,020	2,630	12,000	[30]	3,600	[66]	7,920	4	480
2–3 Sep	7,360	3,550	14,000	[7]	980	[35]	4,900	58	8,120
23 Sep	4,300	192	4,800		—	[20]	960	80	3,840
21 Oct	—	5	5		—		—	100	5
Total %					17,025(32.8)		22,352(43.1)		12,477(24.1)
1983									
14 May	200	—	200						
13 Jun	1		1	100	1	—	0		
21 Jun	6		6	100	6	—	0		
4 Jul	1		10	[92]	9	[8]	1		
12 Jul	30		<50	[80]	40	[20]	10		
23 Jul	200	800	1,000	[60]	600	[40]	400		
6 Aug	2,400	500	3,200	[48]	1,536	[52]	1,664		
10 Aug	—	—	8,000[b]	[42]	3,360	[58]	4,640		
21 Aug	5,748	100	6,300	[19]	1,200	[31]	1,950	50	3,150
15–16 Sep	1,800	3,000	5,000	[5]	250	[15]	750	80	4,000
12–14 Oct	2	—	<10	—	—		—	100	10
Total %					7,002(30.2)		9,415(39.0)		7,160(30.8)
1984									
3 Apr			200						
13 May			1,000						
16 Jul			400	[80]	320	[20]	80		
13 Aug			12,000	[3]	4,440	[63]	7,560	+	
7 Sep			8,000	[10]	800	[32]	2,560	58	6,400
28 Sep			2,000			[20]	400	80	1,600
Total (%)					5,560(23.0)		10,600(43.9)		8,000 (33.1%)

[a]Percentages of age or sex classes in brackets are derived from the average for any date as shown in Figure 1. Data not in brackets are based on field observations.
[b]For convenience in censusing, the lake is divided into western and eastern sectors.
[c]Data provided by J. Bright, personal communication.

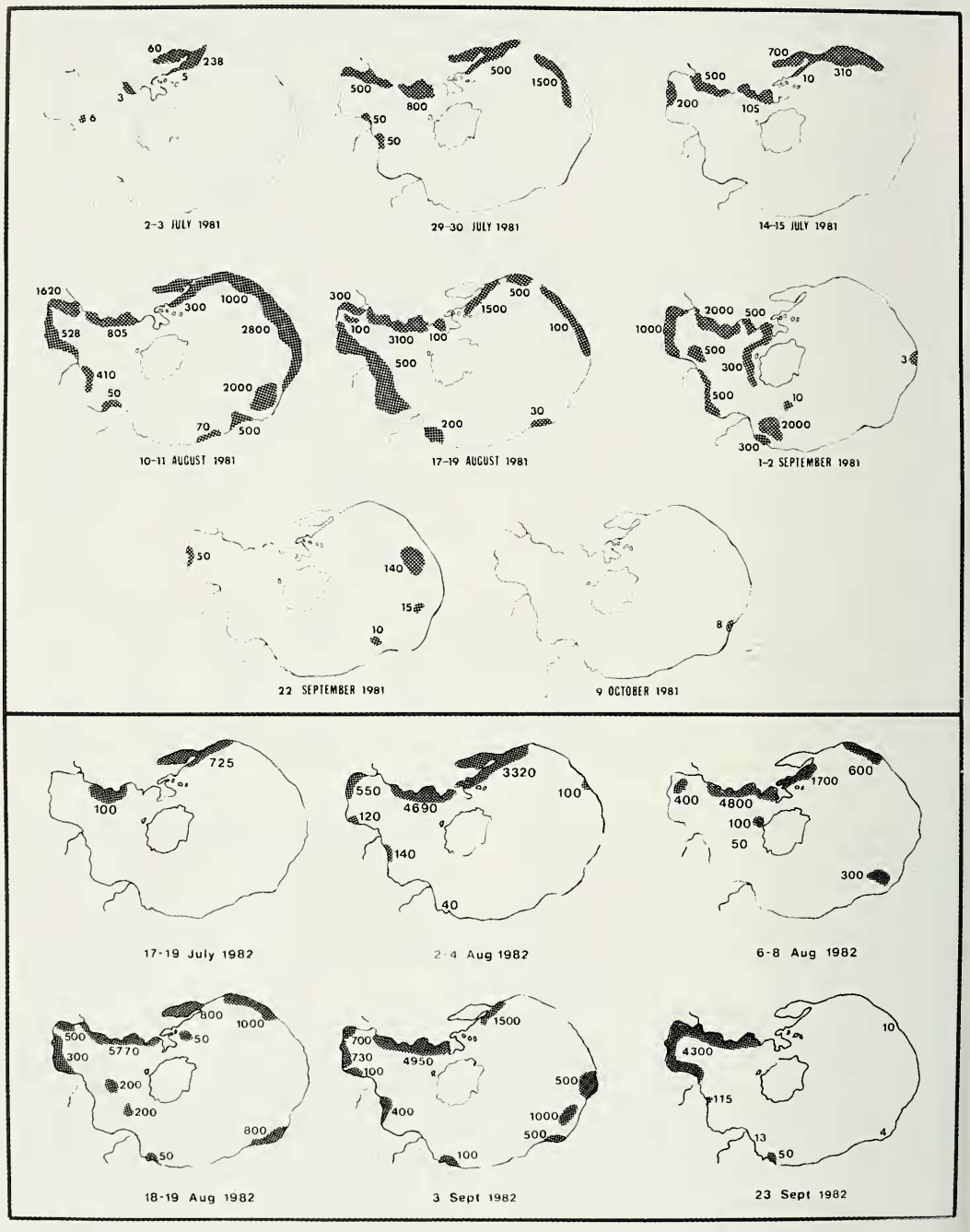

Fig. 4. Distribution of Red-necked Phalaropes at Mono Lake, California, in 1981 and 1982.

ipation of departure. In mid-September 1983, phalaropes foraged mainly at the southwestern and southeastern corners of the lake. In those areas the rising lake had inundated freshwater marshes, creating new substrate for flies in the form of submerged vegetation, and the drowned plants were blackened by masses of pupae.

FOOD.—To study feeding habits, I collected birds in many localities, making deliberate efforts to sample in offshore localities as well as at sites remote from submerged rocks

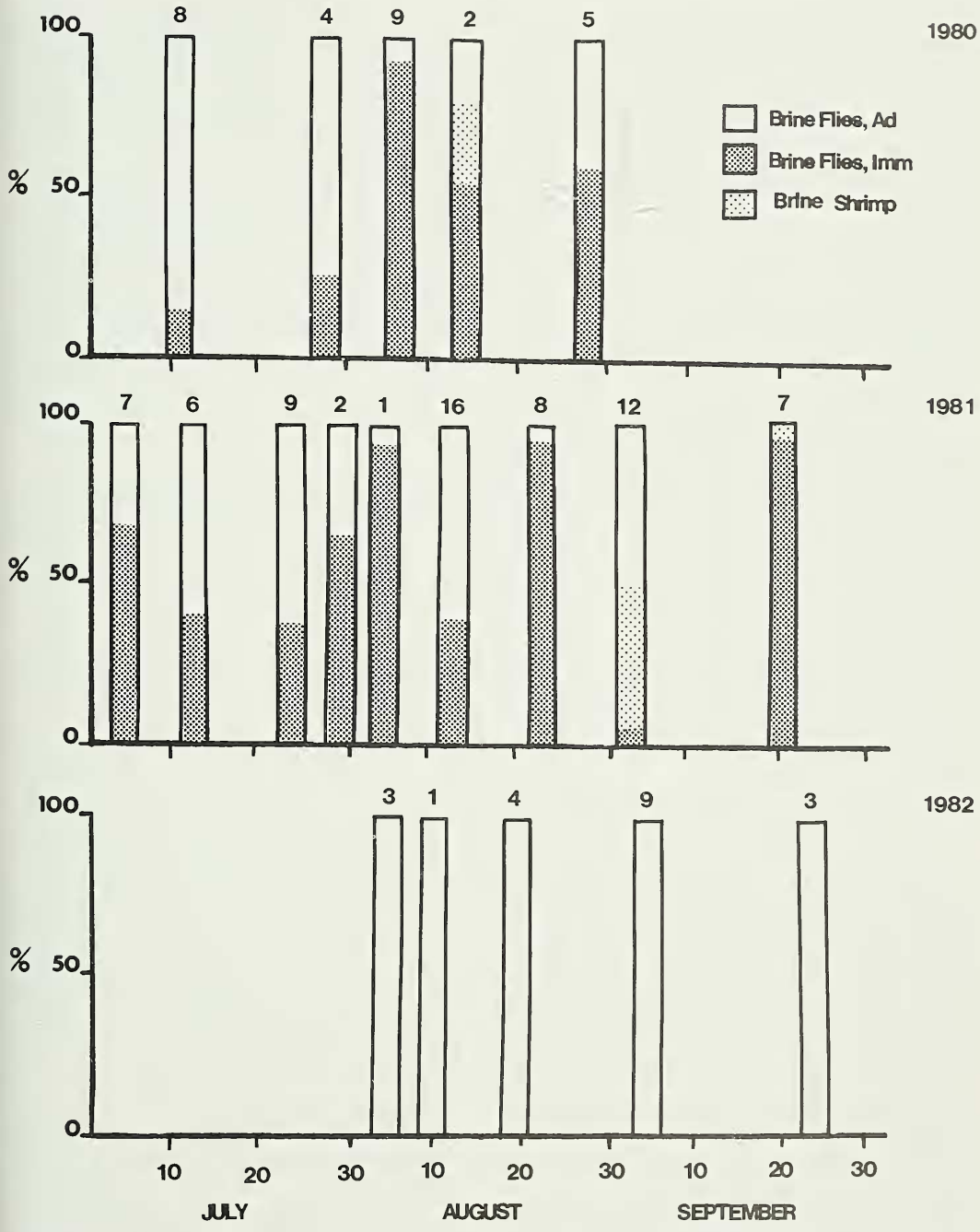

Fig. 5. Diet (% volume) of Red-necked Phalaropes at Mono Lake, California, in 1980, 1981, and 1982. In 1982 the stages of brine flies were not determined after 8 August. Numbers above columns refer to sample size.

Cursory observations of birds feeding over swarms of brine shrimp could easily lead one to infer that shrimp compose the bulk of the phalarope diet. However, careful scrutiny showed that the birds were ignoring shrimp and waiting until an adult brine fly passed by or until water currents wafted a larva or pupa within reach. If this did not occur within five seconds or so, the birds ceased their typical "swim and peck" foraging method and began spinning, which quickly brought larvae to the surface.

Volumetric analysis of stomach contents (Fig. 5) showed that brine flies made up essentially all the diet in July-August, and well over 90% later in the year. The predominance of dipterans was also shown by Wetmore (1925) at Great Salt Lake and by K. Boula (personal communication) at Lake Abert. I estimate that brine flies composed approximately 99% of the phalaropes' diet at Mono Lake. Gravel was present in 70% of the samples, and seeds or unidentified plant parts in 5%. I found no age or sex differences in food preference. Brine fly larvae were the only prey found in the single spring sample (30 April 1984).

In 1980 only 1 adult (14 August) had fed on brine shrimp. In 1981 phalaropes fed exclusively on flies through 21 August. At the next sampling period, 1–2 September, all of 12 birds collected offshore had fed mainly on shrimp, and 7 also contained fly parts; 1 of 7 birds on 21 September contained a few shrimp eggs. In 1982, to investigate the possibility of a seasonal shift in diet, I biased my sampling methods and collected only in offshore sites, and mostly late in the season. Although these samples included birds feeding directly on or over a commercial trap for brine shrimp, no shrimp were encountered. I infer that they are taken mainly when brine flies are unavailable.

WATER USE.—Red-necked Phalaropes visit freshwater sources on the periphery of Mono Lake, often in association with Wilson's Phalaropes (*P. tricolor*), to drink and bathe. Their visitations seem irregular, and daily access to fresh water does not seem to be required. Birds often bathe in the lake itself, sometimes over sublacustrine springs from which fresh water boils to the surface. Formerly, in the 1970s, Red-necked Phalaropes regularly visited small ponds just north of the lakeshore, where many hundreds (M. Morton, personal communication) to several thousand might be seen (Winkler 1977). As the lake has receded, pond use has declined. In 1980 fewer than 500 frequented the ponds each day, in 1981 birds were less abundant, and since 1982 the ponds have been avoided. Visitations occurred mainly in late afternoon, or even after dark, when groups of 5 to 20 might fly in. After circling nervously for several minutes, they would alight and bathe or drink frantically for 30–60 seconds before returning directly to the lake. This nervous behavior was unlike their calm demeanor at freshwater sources on the lakeshore, where they might bathe and preen for an hour or more. Presumably it was related to a greater risk of predation.

WEIGHT.—Weight data are shown in Figure 6. Since Red-necked Phalaropes, unlike many migratory shorebirds, do not lay on great fat stores at this point in their migration, it follows that they do not use Mono Lake as a staging area but only as a stop-over location. Fat-free weights of 6 adult females averaged 29.3 g (range 24.8–32.0) and of 10 males 27.8 g (range 24.2–33.4), which is ca 0.3 g less than the mean arrival weights.

MORPHOMETRICS.—Mensural data are presented in Table 2. Although there is no recognized variation in this species, it may eventually be possible to infer the source of the migrants if mensural data from other areas reveal significant differences.

BEHAVIOR.—Phalaropes make sporadic visits to fresh water and sometimes come ashore or climb on tufa boulders to rest and preen. Otherwise, they remain continuously near feeding areas and fly only short distances each day. It is not uncommon to see a half-dozen feeding over a single pupa-covered rock, pecking larval flies from the water column or lunging at adults as they come to the surface. Occasionally one to two birds will act as satellites to a Wilson's Phalarope, waiting for food that the larger bird spins to the surface (Fig. 7). Whether this commensal activity is an energy-saving device or indicates that the Red-necked Phalarope's effectiveness in spinning is less than that of the larger, longer-legged Wilson's is unknown.

MOLT.—Cramp and Simmons (1983: 639) reported that male Red-necked Phalaropes undergo limited molt on the head and neck on the breeding grounds but that females delay until after the start of migration (see also Hildén and Vuolanto 1972). They also reported that (1) molt began in "moulting areas near the breeding grounds," (2) renewal of flight feathers did not usually commence until late September, and (3) southward migration began in August or September.

Data from Mono Lake modify those conclusions. Migration begins in July, and the first migrants appearing shortly after their disap-

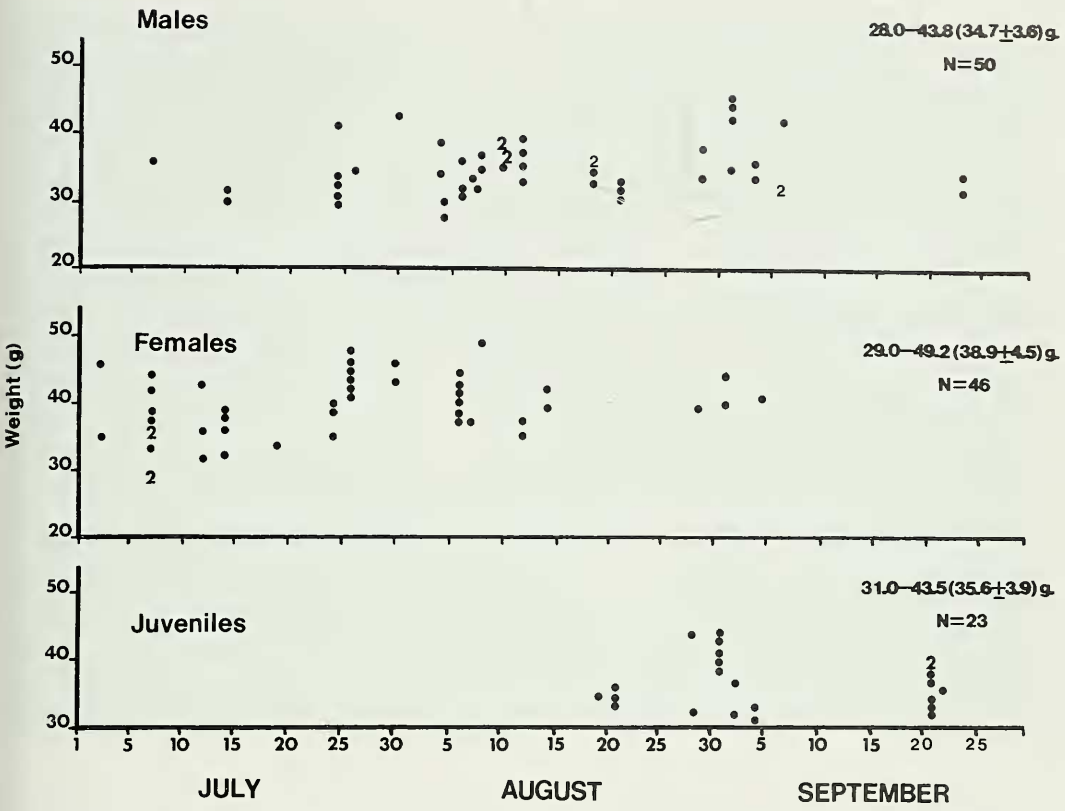

Fig. 6. Weights of Red-necked Phalaropes based on combined samples from 1980 through 1982.

TABLE 2. Measurements (mm) of Red-necked Phalaropes at Mono Lake, California, 1980–1982.

	Exposed culmen			Wing, flat			Tarsus		
	N	Range and mean	S.D.	N	Range and mean	S.D.	N	Range and mean	S.D.
Adult female	47	20.5–24.9 (22.7)	± 1.0	48	105–116 (111.2)	± 2.3	48	19.2–22.2 (20.7)	± 0.7
Adult male	53	20.2–24.8 (22.5)	± 1.0	53	100–113 (106.3)	± 2.9	54	19.4–22.2 (20.9)	± 0.7
Juvenile female	13	22.2–23.5 (22.8)	± 0.4	13	100–114 (108.6)	± 3.7	13	19.4–22.0 (20.9)	± 0.8
Juvenile male	9	20.4–23.0 (21.7)	± 1.0	9	100–109 (103.7)	± 3.3	9	19.5–21.4 (20.3)	± 0.7

pearance from North American breeding areas is noted, (e.g., Jehl and Smith 1970). This schedule allows no time for stops at supposed molting areas.

Adults of either sex begin molting on the nesting grounds, probably at about the same time. From 8 through 12 July 1980, five of eight newly arrived postbreeding females showed light to moderate molt in most of the body tracts, two had just started to molt on the head and neck, and one had not begun. By late July most females showed moderate to heavy molt on the body, and by mid-August many appeared to be in basic plumage, although many feathers had not yet been replaced. The degree of molt in the earliest males, which arrive two weeks later than females, is less than in females examined on the same date. As late as 8 August, however, a few males showed no molt in any tract. Molt of the primaries in each sex (Fig. 8) starts in early August; therefore, many females leave Mono Lake before replacing any. All but one female examined after late August, however, had replaced the inner four or five primaries on each wing. Wing molt in males begins slightly later; one male had not molted any primaries as late as 23 September. I found no evidence

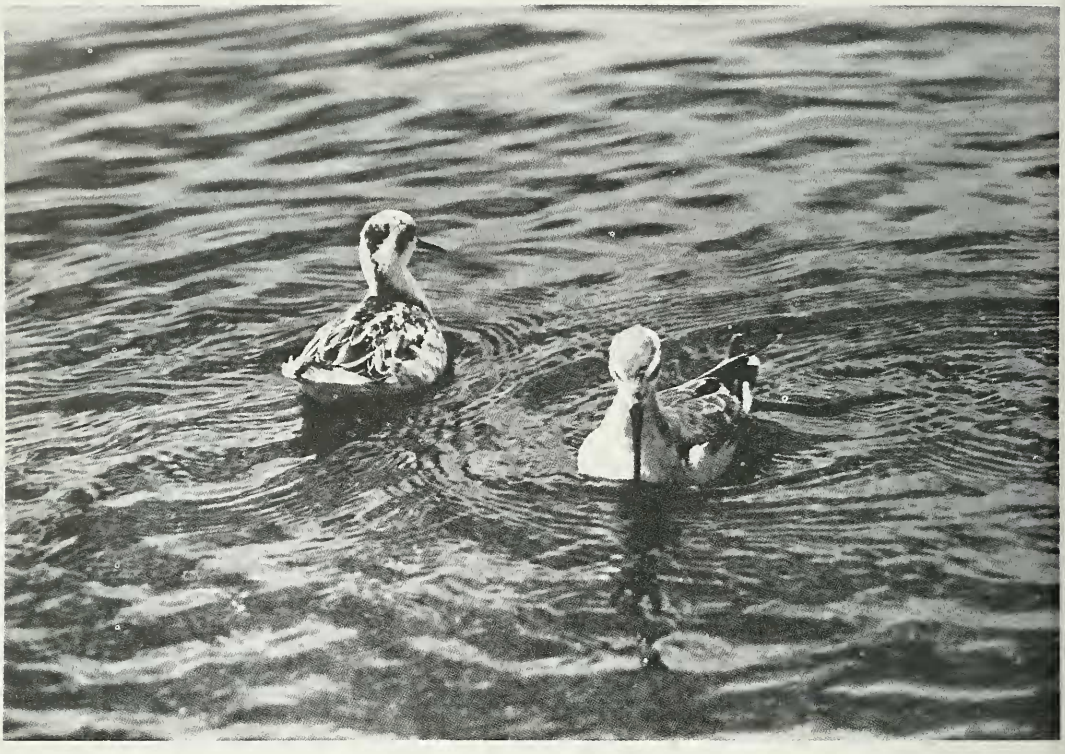

Fig. 7. A Red-necked Phalarope feeding commensally with a Wilson's Phalarope (foreground).

of molt of secondaries or wing coverts, except for the irregular replacement of some greater secondary coverts.

Tail molt (Fig. 9) in many females begins by early July, perhaps while they are still on the nesting grounds. All females examined after late July had molted some rectrices, but only one had completed molt by late August. In males the start of tail molt coincides with their arrival in late July, and all but two examined after 7 August showed some molt. One had replaced all rectrices by 5 September, whereas another on 23 September had not started. The central pair of rectrices is lost first, usually followed by the outer pair or pairs, but this is not invariable and molt is not necessarily symmetrical. One male taken on 28 August had 14 rectrices, of which the central and outer pair were half grown and the fourth pair was just starting to grow.

Juveniles, which arrive in mid-August, have not started to molt body feathers. Some are in heavy molt by late August and nearly all show body molt before departing; one on 21 September, however, had none. Molt of the rectrices may start in late August, but even by late September it remains slight. Juveniles do not replace primaries at this time.

MORTALITY.—I used beached bird censuses to index mortality patterns. Although censuses along 8–16 km of shoreline were made at two-week intervals (often more frequently) in several localities and were spread over the entire migration periods of 1981–1984 (irregular surveys were made in 1980 and 1985), I found only two dead phalaropes. Evidently this phase of the migration imposes no great stress on the species.

RED PHALAROPE.—The Red Phalarope (*P. fulicaria*) is rare in the interior of the western states and provinces (Goossen and Busby 1979). The species remains in the Arctic late into the fall, and inland records, as for the Red-necked Phalarope, probably pertain to birds from the western and central Arctic that are en route to wintering areas in the Pacific. At Mono Lake one or two Red Phalaropes have been recorded in four of six years since 1980, all but one of the sightings (1 September 1980) occurring between 14 and 23 October (1981-1, 1982-2, 1983-1). Goossen and Busby (1979) suggested that most fall migrants in the

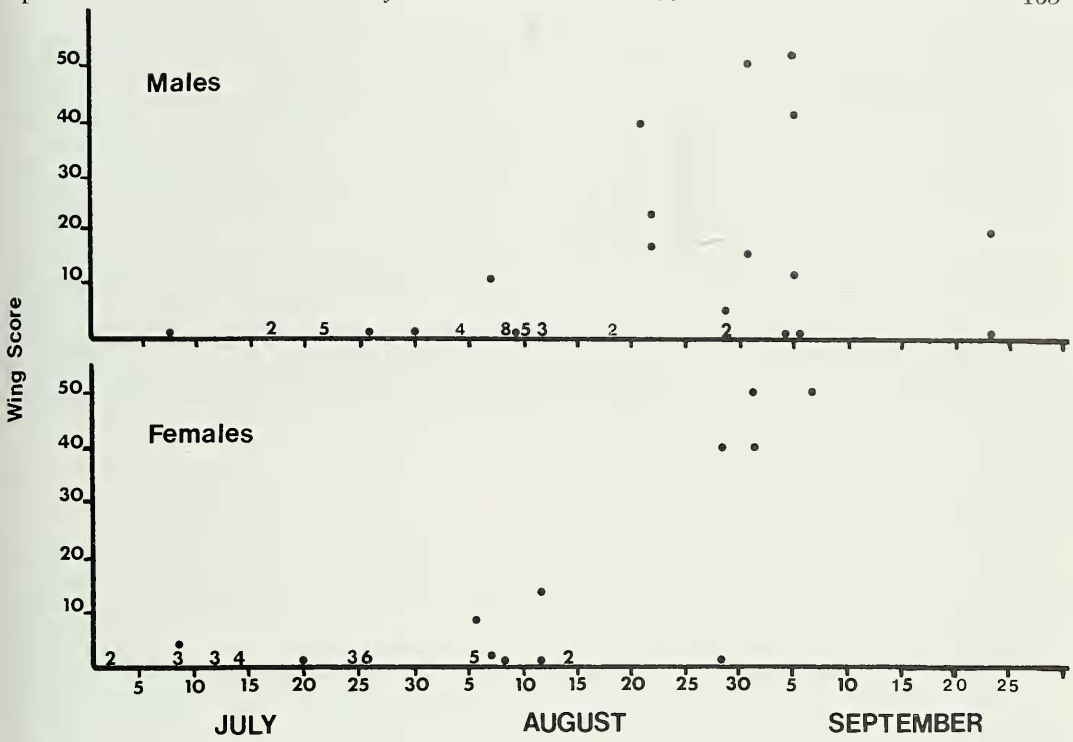

Fig. 8. Wing molt scores of Red-necked Phalaropes based on combined samples from 1980 through 1982.

interior were juveniles. Two of three that I have seen were juveniles; the third was an adult found dead. The juveniles seemed healthy and were feeding well offshore, apparently on brine shrimp.

DISCUSSION

The Red-necked Phalarope uses lakes in the Great Basin as a stopover point on the southward migration and not as a molting or staging area. At Lake Abert, Oregon, K. Boula (personal communication) reported peak numbers of 5,000–7,000 in the first three weeks of August. At Mono Lake I found that peak populations of ca 12,000 were attained by early August and maintained into early September, whereas Winkler (1977) reported the greatest numbers in late August. From shore-based observations, he estimated 21,600 on 30 August 1976, and H. Cogswell (personal communication) estimated more than 40,000 on 22 August 1958. Whether these apparent differences in abundance and timing may pertain to censusing methods, exceptionally large flights in 1958 and 1976, the availability of alternative stopping places in some years, or other factors is unknown. In mid-September 1985, when only a few hundred birds were seen in an incomplete survey of Mono Lake, S. Thompson (personal communication) reported 16,000 near Fallon, Nevada.

Historical data are too scanty to determine if there has been any change in the size of the population using Mono Lake. Fisher (1902) reported "countless hundreds." Grinnell et al. (1918) considered the species very common but barely mentioned Wilson's Phalarope, which currently predominates; perhaps information available to them was inadequate to differentiate between the two species or was based on seasonal data obtained after the main migration of Wilson's Phalarope, which is largely completed by mid-August.

The composition of the Red-necked Phalarope population remained fairly constant during this study. Adult males outnumbered adult females 5:4. This might indicate a faster stopover period for females or their reliance on different migration routes or staging areas, as may be the case for Wilson's Phalarope (Jehl, unpublished manuscript). I suspect, however, that the differences are real

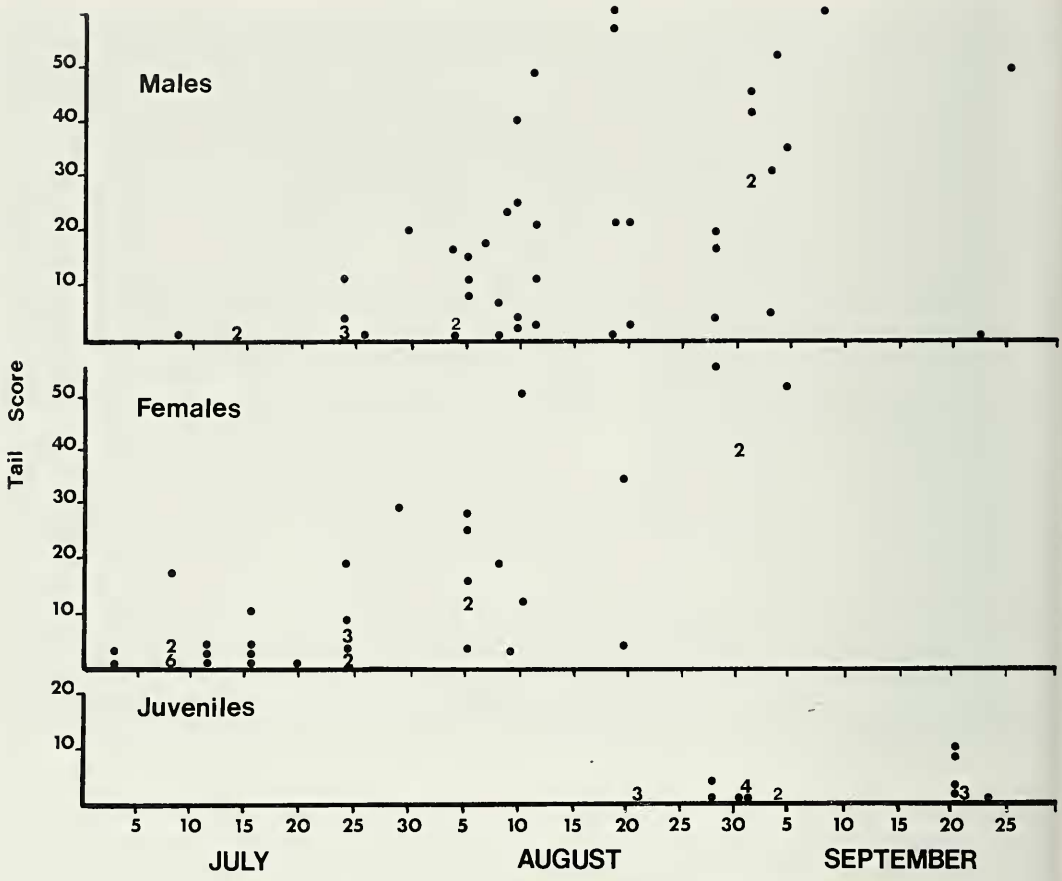

Fig. 9. Tail molt scores of Red-necked Phalaropes based on combined samples from 1980 through 1982.

and indicate an unbalanced tertiary sex ratio, as would be expected in a polyandrous species.

Total population size varied each year from ca 52,000 to 65,000, except in 1983, when it dropped to ca 36,000. The lower numbers in that year cannot be ascribed to censusing error, as techniques and observers remained constant. Nor can they be due to unfavorable food conditions (brine flies were exceptionally abundant) or to a poor breeding season (young were present in expected proportions). Because the migrant population at Lake Abert was judged to be ca 30% below normal (K. Boula, personal communication), I infer that regional events were involved. Two possibilities seem of potential importance. Fresh water was abundant in the far west in 1983, a result of the atypically wet winter of 1982. As a result many aquatic habitats were renewed, and those may have provided alternative stopping points. Perhaps of far greater significance, however, was an apparent drop in breeding populations in the spring of 1983. Low numbers were recorded in the central Canadian Arctic (Churchill, Manitoba, J. Reynolds, personal communication) as well as in the Gulf of Alaska (Middleton Island, P. Gould, personal communication). Birds nesting in those areas presumably winter in the equatorial Pacific off South America, an area that was profoundly affected by an El Niño of unprecedented strength (Rasmusson 1985). The abnormally warm waters are known to have had dramatic effects on breeding birds in the central and eastern Pacific. Reproduction failed at Christmas Island (Schreiber and Schreiber 1984), and in areas influenced by the Humboldt Current major oceanographic changes affected the distribution of fish, seabirds, and marine mammals (Barber and Chavez 1983). I suspect that phalaropes suffered very high mortality on the wintering grounds in 1982, which could not be made up